

**REGULATORY APPROACHES
TO REDUCE PARTICULATE MATTER EMISSIONS FROM
TRANSPORT REFRIGERATION UNITS**



April 4, 2002



California Environmental Protection Agency

Air Resources Board

Overview

- Background
- Regulatory Concepts
- Issues/Concerns
- Stakeholder Input
- Regulatory Development Schedule

Outreach to Date

- Field trips to TRU fleet operators
- Public Workshops (2 prior)
- Three TRU Workgroup meetings
- Surveys
 - ◆ TRU manufacturers
 - ◆ TRU engine manufacturers
 - ◆ Emission control system manufacturers

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Regulatory Goals for TRUs

- Looking for PM emission reductions (& no NO_x increase) from both
 - ◆ New TRUs
 - ◆ Existing TRUs
- Reduce TRU-related risk by at least 75% to communities near
 - ◆ Facilities frequented by TRUs
 - ◆ Roadways

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Current Offroad Compression Ignition Engine Standards

Engine Power (hp)	Tier	Model Year	PM (g/hp-hr)
<11	Tier 1	2000	0.75
	Tier 2	2005	0.60
	Tier 4	2009?	0.30?
11-25	Tier 1	2000	0.60
	Tier 2	2005	0.60
	Tier 4	2009?	0.30?
25-50	Tier 1	1999	0.60
	Tier 2	2004	0.45
	Tier 4	2009?	0.22?

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Background

- TRU activity at facilities
 - ◆ Operation and duration
 - ◆ Loading factors and cycle factors
 - ◆ Emissions and health risk
- Electrification project
- Emission control system readiness
 - ◆ Monitoring development & verifications
 - ◆ TRU demonstrations

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Affected Parties

- Facilities frequented by TRUs
 - ◆ Grocery distribution centers
 - ◆ Cold storage warehouses
- TRU fleet operators
 - ◆ Trailers & trucks with integral engine TRUs
 - ◆ TRU generator sets
- TRU original equipment manufacturers
- Reefer trailer and truck van manufacturers
- TRU engine manufacturers

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Facility Requirements

- Provide electric power hookups for all TRUs equipped with electric standby.

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Fleet Requirements

■ Option #1

- ◆ Phase 1 - Electric drive required on new TRUs
- ◆ Phase 2 - Retrofit requirements on existing
- ◆ Phase 3 - Special new engine standard

■ Option #2

- ◆ Phase 1 - New TRUs with electric standby + low-emitting engine
- ◆ Phase 2 - All TRUs with electric drive + very-low-emitting engine

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Option #1

■ Phase 1

- ◆ **Facilities** install electric hookups for TRUs equipped with electric standby
- ◆ **Fleet operators** choose compliance pathway -
 - ✦ Pathway #1: All new truck/trailer TRUs with electric standby
 - ✦ Pathway #2: All new truck/trailer TRUs use alternative-fuel
 - ✦ Pathway #3: Retrofit existing TRUs - reduce average fleet PM emissions by 75%
- ◆ Per replacement schedule until 100% turnover

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Option #1 (cont'd)

■ Phase 2

- ◆ Technology review for retrofit
- ◆ Retrofit certain existing TRUs
- ◆ Expansion of Phase 1 affected facilities and fleets
- ◆ Compliance date - mid-2006

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Option #1 (cont'd)

■ Phase 3

- ◆ Special category new engine standards
 - ✦ TRU integral engines
 - ✦ TRU generator engines
- ◆ Compliance date - 2009

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Option #2

■ Phase 1 (effective 2004 - 2008?)

- ◆ **Facilities** - install electric hook-ups

- ◆ **Fleets** -

- ✦ New TRUs with electric standby, and
- ✦ Low-emitting engines (0.20 g/hp-hr PM range)

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Option #2 (cont'd)

■ Phase 2 (2008? And beyond)

- ◆ **Facilities** - Electric hookups

- ◆ **Fleets** - All TRUs

- ✦ Electric standby, and
- ✦ Very-low-emitting engine (0.05 g/bhp-hr range)
- ✦ Special schedule for TRUs purchased during phase 1

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Issues/Concerns

- Which Facilities should be affected?
 - ◆ Distribution centers
 - ◆ Cold storage warehouses
 - ◆ Retail outlets?
 - ◆ Three or more loading dock bays?

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Issues/Concerns (cont'd)

- Which fleets should be affected?
 - ◆ Based and operated in California
 - ◆ 3 or more TRU-equipped trucks/trailers?

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Issues/Concerns (cont'd)

■ General

- ◆ Cost & cost effectiveness
- ◆ Harmonization with other regulatory compliance deadlines
- ◆ Compliance pathway flexibility

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Issues/Concerns (cont'd)

■ Electrification

- ◆ Lead time for design change implementation and compliance
- ◆ Standardization of electrical connection hardware
- ◆ Electric power availability
- ◆ Emergency exemptions for power grid upsets

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Issues/Concerns (cont'd)

- Aftertreatments or fuels
 - ◆ Reporting and recordkeeping requirements to assure continued exclusive use of special fuel
 - ◆ Verified control technology availability
 - ◆ Fuel availability

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Stakeholder Input

- Informal comment period now
- Continuing Workgroup meetings
- Individual meetings with ARB staff
- Formal public comment period starts with 45-day public notice in October

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Schedule

- Workshops between now and November 2002
- Release draft regulation and staff report October 2002
- Board Hearing - December 2002

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